

## **Planning Engineering Exchange Programs From The Proposal To Final Evaluation**

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**Recent History:** Since 1992 we have seen increased support for engineering exchange programs that involve coursework, internships, faculty exchange, curriculum development, and learning technologies. But given the actual needs of our students and institutions, these new grant funds are spread very thin.

The Fund for the Improvement of Postsecondary Education (FIPSE/USDE) is now conducting its third round of competitions for multilateral exchange program grants. These come under the North American Mobility in Higher Education program, and the European Community/U.S.A. Joint Consortia for Cooperation in Higher & Vocational Education. There seems to be increased interest in international student and faculty exchange at the National Science Foundation (NSF). One example is NSF support for the GE3 Program of the Institute of International Education (IIE), a program of academic exchanges and internships among some 40 U.S., Austrian, French, and German institutions. FIPSE also funds a faculty exchange program that directly complements GE3.

This paper is based on the author's experiences in evaluating several FIPSE and NSF-funded exchange projects, reviewing proposals for FIPSE, and in doing "pre-submission" reviews for clients. I will begin with a discussion of problems that can be fatal to a funding proposal. Remember that flaws in the proposal often reflect gaps in planning that can undermine a project in its second or third year. I will then move on to recommendations for planning an exchange program. The goal is to help engineering faculties write competitive proposals.

My observations are based on proposals for the program entitled "European Community/U.S.A. Joint Consortia for Cooperation in Higher and Vocational Education." This program supports new working relationships among academic institutions, non-governmental organizations, and industry, with a special interest in student internships. Here you have the added challenge of joint proposals that require close cooperation during their preparation.

EC/USA program funding was limited to academic/training institutions. Each consortium had to have a lead institution and two other partners, both in Europe and the U.S. At least two partners in each group had to be academic or training institutions; the third and additional partners could be industries, governmental and non-governmental agencies, businesses, research institutes, etc. All disciplines were eligible. The lead European partner was expected to have previous experience in an EC education and training program (ERASMUS, COMETT, PETRA, FORCE, etc).

Let us begin by looking at the FIPSE review criteria:

### **Significance:**

- 1) To what extent does the project address an important problem or need?
- 2) To what extent will this differ from, or improve upon existing practices?
- 3) Will the project benefit students (as distinct from researchers)?
- 4) Can this work have a broader impact, as a model for other disciplines?
- 5) Will the project provide cost-effective services?

### **Feasibility:**

- 1) Based on the stated problem or need, is the proposed project an appropriate response -- will this plan achieve the claimed results?

- 2) Is the applicant capable of doing the proposed work?
  - ⇒ Does the applicant understand the problem or need?
  - ⇒ Quality of the project design (clear objectives, workable approach, good evaluation plan, etc.)
  - ⇒ Adequate resources? – money, personnel, facilities, equipment, supplies, etc.
  - ⇒ Qualified personnel in key roles?
  - ⇒ Prior relevant experience?
  - ⇒ Commitment of the applicant and any other participants?
  - ⇒ Sufficient contribution of resources by each participant?
  - ⇒ Does their prior work in this area indicate a stake in the success of the project?
  - ⇒ Likelihood of continuation after the end of the grant?

3) What is the potential for the dissemination of information? Will other organizations be able to use this? (This requires an understanding of what can be learned from the project, why that knowledge is important, to whom it is important, and how to make it useful)

## **Ten Common Problems in Grant Proposals**

**“Over-Written” proposals:** A FIPSE or NSF grant announcement begins with broad philosophical statements about the program and its objectives. Some applicants use the introduction as a proposal outline, and in an effort to address every possible issue, they make insupportable claims and promises. It is important to get straight to the key points: the need or problem, a clear solution and outcomes, and a workable plan for implementation, dissemination, and evaluation. Applicants should write their proposals around the criteria for evaluation.

Writers must avoid making simple concepts more complicated than they have to be. The trick is to translate sophisticated or complex ideas into plain English. Even a short ‘dissertation’ is probably overkill. Writers must ask if the proposal is overly ambitious -- are the planners trying to do too much? In a ‘busy’ proposal it is easy to lose sight of the key concepts and objectives, and once that happens, the proposed activities probably won’t get the job done. Writers should build a tight, coherent working plan around a few well-defined objectives. Less can be more.

The best proposals are elegant in their simplicity, and at least where FIPSE is concerned, suitable for reading by an educated layperson.

**Failure to differentiate the proposed activity from what already exists:** This was a common shortcoming in proposals for international curriculum development. The projects dealt with lecture and lab courses, software, Internet-based teaching materials, course materials for distance learning, data bases, and resource centers. It becomes harder each day to conceive of totally original or unique projects. Academic exchange, practical experience, curriculum development, and distance learning are familiar concepts, but may be new in a given context or application.

It may not be easy to document existing courses, software, and Web materials – but the effort must be made. This would have to be done for a product development and marketing plan, so why should this be any different? A lot of this work is done under grants, so reports often exist in print or on the Web. One way to send up a red flag is to just say that “nothing of this kind exists.” It is more impressive to see a clear explanation of how the proposed work is the same, complementary, or different from existing efforts.

**Disconnect between international curriculum development and student exchange activity:** In a number of the proposals for international faculty curriculum development and travel support, the student exchange component was disconnected, almost an afterthought. Some proposals lost points because the curriculum development work could have been done by faculty, without moving or

using students to test and validate the new course materials. When a grant announcement speaks of student mobility, all project activities should in some way involve or support that principle.

Here again, many of the writers didn't do their homework. It's hard to "internationalize" a curriculum when you lack information on the other systems, especially the competencies that students develop in them. The question is what can we offer to our overseas colleagues, and what can they bring to us? To answer that you may have to get beyond individual courses, by looking at competencies such as engineering design, product realization, and manufacturing.

**Underdeveloped plans for student activities during the exchange period:** Some proposals called for short-term exchange visits, but lacked a clear plan of activities that would deliver a cost-effective learning experience. Even in proposals for longer exchanges, very few discussed the specific learning opportunities awaiting students at the partner institutions.

In order to successfully *market* a program, there must be a professional or career rationale that makes sense to students. Students want to know why they should study abroad, what they will be doing, and the likely payoff. It is fine if each student has a slightly different mix of course work and practical training. There is no reason, however, for not having activity models with stated learning objectives, whether you are planning courses, projects, or internships. This seems reasonable if an institutions plans to give academic credit. Moreover, this information is needed for marketing a program, recruiting students, budgeting, and later evaluation.

**Insufficient plans for industry contact and practical experience:** None of the proposals provided an adequate description of the industrial internships, i.e., the content of the practical learning experience. This was surprising, given the experience of the European partners with internships and practical training. When European schools send out students for practical training in industry, it is fair to assume that the work experience has been defined. After all, this is an integral part of the student's formation. U.S. employers also understand what interns can do, and how interns can be used to their advantage.

It is hard to believe a proposal in which students will be recruited and sent overseas without a credible plan. Even in the proposal, there should be model job descriptions for interns, adapted to meet the project objectives, and capable of modification as the project moves forward.

None of the proposals had a plan for analyzing the work experiences of student interns, despite all the talk about articulation. Internship experiences can tell us much about the *competencies* expected of graduates in other countries. We can learn much about the goals and boundary conditions for professional preparation.

**International faculty articulation "dialogue" not well planned:** If this is to be a major funded activity, the plan must explain *why* the dialogue is necessary. It is not enough to just discuss or explore "differences." There are five key points: a) the need or rationale for the dialogue; b) critical issues and core questions; c) the type of information to be exchanged and analyzed; d) content of the analysis and reports; and e) who will do this work.

It was intriguing to find heterogeneous groups of European and North American institutions – research universities, bachelors-level schools, community colleges, and other technical or specialized institutions. Much could be learned from articulation within a mixed consortium. However, the U.S. proposals offered virtually no discussion of what might be learned by analyzing student work in the different levels and types of European institutions – e.g., a comparison of courses in a U.S./B.S. engineering program and a German fachhochschulen. Applicants should at least discuss how heterogeneous institutions may help or hinder the project.

It is fair to assume that faculty members know enough about their partner's curricula and courses to identify the key issues for a dialogue. Unfortunately, this seldom came across in the proposals. For example, what scientific background is needed for success in certain German university courses? How will design courses in a U.S. engineering school complement the education of a student from Lyon? What are the characteristics of computer use in selected civil engineering courses in the U.S.

and the Netherlands? What preparation should a U.S. student have for 4th and 5th year projects in a French polytechnic institution? The proposal must define what the faculty wants to learn, why that is significant, and how that information can serve a wider audience.

**A lack of information on the capabilities of each partner.** Standard college and university publications are often unsuitable for exchange and study-abroad students. I once asked the partners in a large engineering exchange consortium to write down what they could offer to exchange studies, and how they cultivated professionalism among their own students. The response, negligible. A proposal should summarize the opportunities that each partner can provide, based on the level of the institution and its students, the type of educational program, and relations with specific industries. The lead institutions must address the exchange of information as part of a workable project plan.

In general, the proposals failed to describe the relationships between industry and the partner institutions. Regional industries can exert a strong influence on the academic programs and internship prospects at the European technical institutions. This was problematic in linkages with Eastern Europe, where institutional and industrial capabilities vary widely in struggling economies. These proposals must show that the planners have considered these issues. In many cases, task-oriented faculty exchange in the first year would be a desirable feature to build into the funding request.

**Sweeping claims about enhanced professional opportunities for graduates:** A number of the proposals claimed that students with international exchange experience would be more attractive to employers. Unfortunately, they failed to describe that experience in terms that an employer would understand. It would have been simple enough to ask recruiters in several multinational companies how they value international experience. It is important to build employer acceptance, starting in the preparation of the proposal, and following through as students return from overseas to commence their job search.

What could a U.S. student learn in a French or German institution, in terms of engineering and management practices? Is that knowledge a marketable commodity? What happens when a graduate from the U.S., Europe, or Mexico seeks to work in one of the other countries? None of the engineering proposals addressed the issue of professional licensing or recognition, often an impediment to international mobility. Proposal writers should be familiar with the sourcing practices of multinational companies and professional registration procedures.

**Some U.S. institutions did not write their own proposal... Ouch !!** Some U.S. partners simply added their names and a budget to a proposal written by the European lead partner. You cannot assume that a European partner will address the U.S. grant program review criteria, notably feasibility and evaluation. Many applicants did not allow time for review and editorial changes to comply with the sponsor's requirements. In effect, a number of the U.S. partners failed to take responsibility for the content of their proposals.

No matter how much time the sponsor allows, there never seems to be enough time to research, write, and perfect a proposal. However, some of the more competitive proposals were based on existing relationships. My recommendation for future competitions is for institutions to agree, at the outset, on central coordination and responsibility for the preparation of proposals. With the availability of FAX, E-mail, and FTP file transfers, partners can rapidly exchange information. Potential partners should be identified well in advance, to allow plenty of time to exchange the necessary information on the partners and cooperating industries. Much of this "boilerplate" will change very little from one proposal to the next. Where FIPSE proposals are concerned, the review criteria provide a template to speed the writing of a first draft.

**Inadequate evaluation plans:** Weaknesses in the evaluation plan usually trace back to shortcomings in the basic project concepts and outcomes. Proposals to agencies like FIPSE need a touch of experimental design, because FIPSE wants to know what can be learned from a project and how it will be applied. For example, a proposal for "transatlantic" faculty workshops failed to define the content of those workshops and the desired results. People would come great distances for an undefined, yet "important" activity. This made it impossible to construct a sensible evaluation

plan.

The same problem was observed in curriculum development and articulation proposals that didn't explain what issues needed exploration, what might be learned, and how this would be analyzed and reported. Where the outcomes were unclear, the evaluation plan was in trouble from the start.

Where do you find evaluation criteria? Look to the general and specific promises that you made in your proposal. This will also tell you what management information you will need to run the project. Proposals fall off the tracks when they promise outcomes that cannot be controlled or achieved through the project plan. For example, a proposal claims that there will be a 50% increase in the number of exchange students, and half will be women and minorities. Laudable goals, but both are subject to variables such as the economy, student finance, politics, social conditions in the host countries, student attitudes, and marketing strategy. In order to "control" student attitudes, institutions must first do a bit of market research into student and faculty attitudes on international issues and career preparation. The findings may prove useful in developing a marketing strategy that addresses the concerns most likely to prevent exchange.

As a project evaluator, I have found that the same information can be used for evaluation and for ongoing project management. I look for a project plan built upon a continuous process for gathering, evaluating, and acting upon project management information. Some problems cannot wait for a static, yearly evaluation -- it is important to identify and solve problems in real time.

### **Once your project is underway...**

**Understand Information Requirements and Plan Information Exchange:** This is an issue before and after you receive your grant. First of all, do not assume that you will get the information when you need it or in a useful form -- no matter what you heard over dinner with your partners. Your partners may send you translated materials, but the content may not be what you need. Information resources are not the same in overseas institutions, because of different recruiting, advising, and regulatory practices. Regulatory practices often determine what information is available, course descriptions being a prime example. A majority of overseas programs do not go through the kind of review and documentation that we associate with accreditation.

Write down the information that you will need to market your program to students and faculty, and what you will need for academic planning and later evaluation. Write a summary of the capabilities and marketable features of your partner institutions and industries. Determine what information each partner can actually provide and the media that they will use. Decide just how useful the information will be. If you don't like the answers during the pre-proposal stage, remember that it may be harder to fix an information problem once the project is underway. Information can have a major impact on advisor workload, marketing & recruitment, basic student response, and the ability of students to take responsibility for research and planning

**Learning from Your Project:** Now that you have the grant, do you really know what your students and faculty will learn about engineering practice in the host systems? Will you be able to capture what they learned and tell your sponsor about it? That knowledge may actually be one of your deliverables.

**International Internships:** Does your sponsor expect to see progress in placing U.S. students in overseas internships? What are you going to do about it? What if a student walked into your office to inquire about an internship -- could you provide an adequate description of what he/she could do at the host sites?

Internships, like exchange programs, do not sell themselves. You must be prepared to market the idea of internships. That means knowing what they consist of, what the industrial partners can provide, and how you will evaluate and credit the experience. If you aren't sure of these things, go back to square one and get more information.

**Marketing:** The most common shortcoming in exchange proposals is the lack of a marketing plan, much less an awareness of marketing needs. When parity is so critical, this is the Achilles heel of most exchange projects.

It is common for discussions of “marketing” to lapse into a description of recruiting tactics -- mailings, posters, a presentation during orientation, and so forth. Very rarely do you hear a discussion on how you go from a program concept to a marketing strategy, and from there to the content of recruiting messages.

The first step is to define your clients and their needs. I submit that very few engineering schools have surveyed their students and faculty on “things international.” Too little is known about attitudes, likes and dislikes, wants and needs. This makes it difficult to state a marketing concept for the program and to build a strategy around it, including a definition of the product. This might be a good focus group activity -- something that your marketing students could do as a project.

Some kind of product differentiation may be necessary. Students may want more than just access to standard courses in another country. What about special seminars, project education, field work, internships, research, language only, or language & culture in a professional context? Would they respond to international projects that start at home and culminate in a short, intensive overseas experience? Do your partner schools present these options?

**Bottom-Line Marketing Concept & Strategy:** I submit that students need to know the following: Why should I go, what can I do there, what is worth knowing about engineering practice in that country, and how will this help me get a job and further my career? In short, the strategy should grow from a professional rationale for study abroad.

I believe that we need a different approach with engineering students. We cannot just say “go to Germany, take language and engineering courses, sit in cafes, experience culture, and come home transformed.” German students develop competencies in their programs that may appeal to U.S. students. I suggest a conceptual and project approach, in which we help students to form an overall concept for the exchange. For example, acquiring an understanding of German manufacturing engineering practices. Then frame the exchange as a project, with objectives, methods, desired outcomes, and some means of evaluation. The methods may include courses, projects, internships, a thesis, and so forth. We train our students to conceptualize and do projects, so why present exchange in ways that don’t appeal to engineers?

Finally, tactics. Remember that tactics are only a means to an end, and they depend on an underlying marketing concept, message, and strategy. Once you have decided on the message, then it’s time to think about where and how to spread the word, and who can help you do it. That means an effort to cultivate faculty buy-in, faculty advocacy, and employer interest. A few tactics and tools:

new student recruitment	freshman orientation	posters
presentations	student mailings	returning student success stories
academic advisors	publicize employer statements	campus cultural programs
language programs	financial incentives	

**Evaluation Plans:** We have to outgrow the annual retrospective evaluations that are so common in these projects. It does no good to report a marketing problem months after it arises. Although some principles of continuous evaluation don’t work well in a group of universities, this should not prevent continuous feedback from the players. Evaluation, management, and planning information can be essentially the same. It is important to periodically revisit the project concept, strategy, and tactics. Evaluative information must do more than fill an annual report -- it has to be used to make modifications and to plan future activities.



As discussed in the pre-proposal section, most problems with evaluation plans start in the proposal. It's important to think in terms of experimental design. When you write a proposal, you claim to have a solution to a problem. It is assumed that you will do the work, but you also have to validate your solution. If it doesn't work, you have to know why. A key piece of advice is, once again, to avoid making claims or promises that depend on variables you don't control.

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From 1987 to 1994, Mr. Phillips served as an ABET staff member and consultant. Currently he is Managing Director of Collegeways, a consulting group serving accrediting agencies, professional societies, international education organizations, and students. Mr. Phillips is the principal investigator on a FIPSE-funded project known as the "North American Engineering Exchange Guide"(see note below). He has served as a USDE/FIPSE reviewer and as a project evaluator for the Institute of International Education (IIE). He is co-author of a comparative review of 21 European university engineering programs, published in the Netherlands in 1993. In 1991, he published the ABET/Exxon Engineering Student Achievement Profile, a study of 2,400 minority and non-minority engineering students from secondary school through their university years. Before joining ABET, Mr. Phillips was Dean of Admissions at the School of Engineering & Applied Science of Columbia University. His experience in admissions and student services spans seventeen years in both private and public institutions.

**Note:** The North American Engineering Exchange Guide is a data base on 26 Canadian, Mexican, and U.S. institutions that act as a consortium within the North American Regional Academic Mobility Program (RAMP). This program is administered by the Institute of International Education (IIE). This information is intended for faculty advisors and students in the RAMP institutions, but will be useful to non-RAMP institutions seeking engineering exchange partners in Canada and Mexico.

The Guide may be of use to international admissions officers and international student evaluators. In addition to profiles of the RAMP institutions and programs, there is a discussion of the three educational systems, over 50 engineering curriculum charts for each country, and files of selected course descriptions. The information is presented in a short text, accompanied by four 3.5" floppy disks.

Requests for copies may be directed to:

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## 1. The “Killer” Proposal for International Exchange

If you want to be uncompetitive, here’s how...

Use the philosophical statements & broad objectives  
in the front of the grant announcement

Promise to meet all those objectives  
(even if they aren’t things you want to do)

Spread yourself thin – a mile wide and a foot deep

Lose focus and impact

Flunk on feasibility and implementation

### **Solution:**

Write the proposal around the criteria for evaluation

Plan to do a few things very well – less can be more

Build a tight, coherent working plan  
around a few well-defined objectives

Writers must force themselves  
to translate complex ideas  
into plain English.

Write to the level of an educated layperson

Seek elegance through simplicity

## **2. Homework and Concept!**

**Applicants must do their homework and discuss existing efforts in their topical area**

Critical step in developing a viable, marketable project concept

Understand need, alternative solutions, clients...

It becomes harder each day to conceive of totally original or unique projects

Common Unsupported Claim #1: “nothing of this kind exists now and this thing will be unique when (and if) we get it done”
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How was that conclusion reached?

Special problems with proposals involving development of software and Web materials

Your approach can be the same, complementary, or different from existing efforts

You might adapt a model from another discipline

Bottom Line: clear concept, understanding of the task, realistic promises, a solid working plan – including evaluation

## **FIPSE Proposal Review Criteria**

### **Significance:**

- 1) To what extent does the project address an important problem or need?
- 2) To what extent will this differ from, or improve upon existing practices?
- 3) Will the project benefit students (as distinct from researchers)?
- 4) Can this work have a broader impact, as a model for other disciplines?
- 5) Will the project provide cost-effective services?

### **Feasibility:**

- 1) Based on the stated problem or need, is the proposed project an appropriate response -- will this plan achieve the claimed results?
- 2) Is the applicant capable of doing the proposed work?
  - ⇒ Does the applicant understand the problem or need?
  - ⇒ How good is the project design (clear and sensible objectives, a workable approach, a good evaluation plan, etc.)
  - ⇒ Are the resources adequate? – money, personnel, facilities, equipment, supplies, etc.
  - ⇒ Are the key personnel qualified?
  - ⇒ Is the applicant's prior experience relevant?
  - ⇒ Are the applicant and any other participants really committed to the project?
  - ⇒ Is each participant contributing sufficient resources?
  - ⇒ Does their prior work in this area indicate a stake in the success of the project?
  - ⇒ How likely is it that the project can be continued after the end of the grant?
- 3) Potential for dissemination? Is this something that other organizations can use?

This requires an understanding of what can be learned from the project  
why this knowledge is important  
to whom it is important  
how to synthesize, package, and deliver the knowledge

Summary: Common problems have been observed in joint proposals for the funding of international student and faculty exchange, curriculum development, and articulation activities. These problems fall into 10 areas: 1) "Over-Written" proposals that lack clarity and focus. 2) Failure to distinguish the proposed activity from existing efforts. 3) Weak connections between international curriculum development plans and student exchange activities. 4) An inadequate plan for student activities, particularly on short exchange visits. 5) An inadequate plan for industry contact and practical experience. 6) Poorly developed plans for an international dialogue on curriculum and course articulation. 7) Insufficient information on the capabilities and expected contributions of each partner. 8) Unsupported claims about expanded professional opportunities for graduates. 9) Not all of the partners actively participated in writing the proposal. 10) Weakness in terms of the experimental design, project learning objectives, and plans for evaluation.